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REMARKS

Applicant wishes to thank the Examiner for considering the present application. In the Office Action dated June 24, 2005, Claims 1-21, 23, and 25-34 are pending in the application. Applicant respectfully requests the Examiner to reconsider the following rejections.

The present application is generally directed to a communication system 40 that is best illustrated in Figure 3. The common feature that is presented throughout the claims is that the satellites generate a plurality of beams with variable beam widths to provide a substantially uniform cell size. The variable beam width is desirable to maintain the cell size because the satellites are in an elliptical sub-geosynchronous orbit and therefore their positions move relative to the Earth. By maintaining the size at the cell size at the ground by changing the beam width, a uniform predicable system is formed.

Claim 1 is directed to a communications system that includes a plurality of regional ground stations and a plurality of satellites 42a, 42b, 44a, 44b located in an elliptical sub-geosynchronous orbit 32 with respect to the earth. The orbit 32 is best illustrated in Figure 2, which is described on Page 9, line 14-page 10, line 15. The satellites operate in a service area in a synchronized manner to provide continuous coverage to the service area. The satellites 42a, 42b, 44a, 44b generate a plurality of beams with widths that vary relative to position in the orbit to provide a substantially uniform cell size 48, 52 covering the service area. The system further includes a plurality of user terminals within the service area receiving communication signals from the satellite.

Claim 2 recites that the ground station is coupled to one selected from the group consisting of internet service provider, television center 60, and a corporate internet 62.

Claim 3 recites that the uniform cells are substantially fixed within the service area.

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Claim 4 recites that the plurality of beams provide equal capacity density to the cell size.

Claim 5 recites that the sub-geosynchronous orbit has a minimum elevation angle greater than 10 degrees in the service area.

Claim 6 recites that the service area is a primary market.

Claim 7 recites that the satellites comprise a phased array to form the plurality of beams.

Claim 8 recites that the first plurality of satellites are disabled when coextensive with a geostationary orbit. This insures that no interference exists between the two systems.

Claim 9 recites that the plurality of satellites is less than 9.

Claim 10 recites that the plurality of satellites is 4.

Claim 11 recites that the plurality of satellites is 5.

Claim 12 is another independent claim directed to a communications system. Claim 12 specifically recites a first plurality of satellites and a second plurality of satellites. The first plurality of satellites are located in a sub-geosynchronous orbit and have similar limitations with respect to the elliptical sub-geosynchronous orbit and beams with widths that vary relative to position in the orbit to obtain a substantially uniform cell size covering the service area. The first plurality of satellites provide a system capacity. The second plurality of satellites are deployed after the first plurality of satellites and provide a second system capacity greater than the first system capacity.

Claim 13 corresponds to Claim 3, Claim 14 corresponds to Claim 4, Claim 15 corresponds to Claim 5, Claim 16 corresponds to Claim 6, Claim 17 corresponds to Claim 7, Claim 18 corresponds to Claim 8, Claim 19 corresponds to Claim 9, Claim 20 corresponds to Claim 10, and Claim 21 corresponds to Claim 11.

Claim 22 is an independent method claim having similar limitations to Claim 1 with respect to the inclined sub-geosynchronous satellite orbit and bearing the beamwidth

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so the beam generated during operation in an active arc of an orbit. Claim 22 specifically recites the steps of handing over an operation from a first satellite to a second satellite to maintain at least the minimum elevation angle and operating the satellite to generate the plurality of fixed cells by varying the beamwidth of the beams generated during the operation in an active arc of the orbit.

Claim 23 specifically recites that the orbit is an inclined eccentric sub-geosynchronous orbit.

Claim 24 has been withdrawn.

Claim 25 is also an independent method claim directed to developing a satellite constellation having a first set of satellites located in an elliptical sub-geosynchronous orbit so that the satellites operate in a synchronized manner to provide continuous coverage to the service area. The satellites generate a plurality of beams with variable beamwidth formed as a function of the orbit position to obtain substantially uniform cell size covering the service area. The second set of satellites form a second satellite constellation having primary market coverage in cooperation with the first set of satellites to have a service area greater than the first service area. This is similar to that of Claim 12 but in method form.

Claim 26 recites launching a third set of satellites to form optimized landmass coverage to cooperate with the first set of satellites and the second set of satellites. The third service area is greater than the second service area.

Claim 27 specifically recites first constellation, second constellation and third constellation comprise SGSO satellites.

Claims 28 and 29 recite, respectively, that the first set of satellites and the second set of satellites do not interfere with GSO satellites.

Claim 30 recites that the satellites and the second set of satellites have active arc size to provide continuous coverage to the second service area.

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Claim 31 recites that the first and second set of satellites have active arcs to be non-interfering with GSO satellites.

Claim 32 is also an independent claim and recites a plurality of regional ground stations and plurality of satellites located in an elliptical sub-geosynchronous orbit with respect to the earth. The satellites operate in a service area in a synchronized manner to provide continuous coverage to the service area. The satellites generate a plurality of beams with variable beamwidths that vary as a function of orbital position to obtain a substantially uniform cell size covering the service area and plurality of user terminals with the service area receiving communication signals from the satellite.

Claim 33 recites that the plurality of satellites operate using a frequency of the GSO satellite.

Claim 34 recites that the plurality of satellites do not operate in the GSO satellite avoidance zone.

Claims 1, 3, 6-7, 9-13, 17, 19-21, 23, and 25-33 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Castiel* (U.S. 2002/0160710) in view of *Porcelli* (6,333,924).

The *Castiel* reference is directed to a communications system that admittedly includes elliptical sub-geosynchronous orbits that provide coverage to a service area. The Examiner admits that the *Castiel* reference does not disclose said satellite generating a plurality of beams with variable beam widths to obtain a substantially cell size covering the service area. The Examiner cites the *Porcelli* reference for this proposition.

The Examiner specifically points to Col. 16, lines 22-25, of the *Porcelli* reference for this teaching. This section is in Claim 20 and recites, "wherein each of said plurality of satellites comprises a phased array antenna operative to change said satellite's overall beam pattern in response to commands based on the location of said satellite in orbit." This claim does mention changing the beam pattern based upon the location of the satellite in orbit. However, no teaching or suggestion is provided in this passage for

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generating a plurality of beams with widths that vary relative to position in the orbit to obtain a substantially uniform cell size covering the said service area. In Col. 10, lines 42-53, the recognition of beam changing sizes is specifically set forth. Line 49 states, "Specifically, when the satellite is at its highest altitude the satellite beam will provide the maximum coverage on the ground, when the satellite is at its lowest altitude, the beam coverage will be minimum." However, Col. 11, lines 1-40 specifically recite adjusting the phase of the RF signal to each element of the phased array antenna to change the beam pattern. Thus, the beam pattern itself is changed rather than generating a plurality of beams with widths that vary relative to position in the orbit to obtain substantially uniform cell size covering said service area. In fact, Applicant has found no teaching or suggestion for obtaining a substantially uniform cell size within the *Porcelli* reference. Also, the *Porcelli* reference does not teach or suggest changing the beam widths although the problem is recognized in Col. 10, as mentioned above. Column 11 merely recites beam pattern changes rather than changing the beam widths themselves. Therefore, Applicant respectfully requests the Examiner to reconsider the rejection of Claim 1.

Claim 12 is also believed to be allowable for the same reasons set forth above. Claim 12 also recites the plurality of satellites are located in an elliptical sub-geosynchronous orbit and have variable beamwidths that vary relative to position in the orbit. Claim 12 also includes a further limitation that is not illustrated in the *Castiel* reference in that a second plurality of satellites are provided to generate a system capacity greater than the first capacity.

Claim 25 sets forth a method of developing a customized satellite constellation that includes similar limitations to that of Claim 1 in that an elliptical sub-geosynchronous orbit is established and that the first plurality of satellites includes variable beamwidths. Claim 25 also teaches launching a second set of satellites to form a

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second constellation with a second service area greater than the first area. The dependent claims of Claim 25 recite an additional third set of satellites.

Claim 32 is a communications system that has a plurality of regional ground stations, a plurality of satellites located in elliptical sub-geosynchronous orbit with respect to the earth so that the satellites use beamwidths that vary the function of the orbital position to obtain substantially uniform cell size covering the service area. As mentioned above, the combination of satellites in elliptical sub-geosynchronous orbit and varying the beamwidths to maintain the cell size is not taught or suggested in either the *Castiel* reference or the *Porcelli* reference.

Claim 3 recites that the uniform cells are substantially fixed within the service area. This is not taught or suggested in the *Castiel* reference and therefore Applicant respectfully submits that this claim is also independently patentable.

Claim 6 recites that the service area is a primary market. No teaching or suggestion is provided in the *Castiel* reference for a primary market.

Claim 7 recites that the plurality of satellites comprise a phased array antenna to form the plurality of beams. This in combination with the limitations set forth in Claim 1 are not taught or suggested in the references.

Claims 9-11 are independently patentable since they set forth that the plurality of satellites comprises less than 9, 4 satellites and 5 satellites. These limitations in combination with those of independent Claim 1 are not taught or suggested in the references.

The claims dependent on Claim 12, namely 13, 17, 19-21 are allowable for the same reasons set forth above with respect to the dependent claims of Claim 1 since they correspond directly thereto.

Claim 23 is allowable since the satellite orbits are inclined eccentric sub-geosynchronous orbits. This in combination with the recitations of Claim 22 are not taught or suggested in the references.

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Claim 26 specifically recites a third set of satellites are deployed that for a third service area greater than the second service area. Applicant respectfully submits that this is not taught or suggested in the references.

Claim 27 recites that the three constellations comprise SGO satellites. This is not taught or suggested in combination with the recitations of Claim 25.

Claims 28 and 29 recite that the first set of satellites and second set of satellites, respectively, do not interfere with GSO satellites. No teaching or suggestion is provided for non-interfering satellites in the references, particularly in combination with the recitations of independent Claim 25.

Claim 30 recites that the satellites have active arc sized to provide continuous coverage to a second service area. The recitations of Claim 30 in combination with those of Claim 27 are not taught or suggested in the references.

Claim 31 recites that the first plurality of satellites and the second set of satellites have active arc sized to be non-interfering with GSO satellites. This claim is a combination of Claims 28 and 29. As mentioned above, the limitations of this claim are not taught or suggested in the references. Therefore, Claim 30 is independently patentable.

Claim 33 is dependent from Claim 32 and recites that the plurality of satellites operate using a frequency of a GSO satellite. This is not taught or suggested in the references and therefore the limitations of Claim 33 in combination with Claim 32 are not taught or suggested in the references.

Claim 22 is also believed to be allowable for the same reasons set forth above with respect to Claim 1 in that the satellites are in inclined sub-geosynchronous orbit and have variable beamwidths. As mentioned above, these features are not illustrated in the references. Claim 22 further recites the limitations of handing over an operation from the first satellite to a second satellite and to maintain at least the minimum elevation angle.

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Claim 34 recites that the satellites do not operate in a GSO satellite avoidance zone. Claim 34 depends upon Claim 33, which depends upon Claim 32. As mentioned above, no teaching or suggestion is provided for a GSO satellite avoidance zone. Therefore, Applicant respectfully requests the Examiner to reconsider the rejection of Claim 34.

Claims 4-5 and 14-15 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Castiel* in view of *Porcelli* in further view of *Taormina* (6,257,526).

Because the *Taormina* reference does not describe beam widths that vary relative to orbital position, the Applicant respectfully requests the Examiner to reconsider the rejection of Claims 4 and 5 and 14-15. Claim 4 specifically recites providing equal capacity to the plurality of beams.

The *Taormina* reference describes a first deployment of a plurality of satellites in a medium earth orbit and later deployments of pluralities of satellites in the medium earth orbit. If demand on the satellite constellation is increased further, more medium earth satellites may be deployed. However, if spacing between the MEO satellites becomes too small, the satellites may be deployed in an inclined orbit 38. (See for example Abstract and Col. 5, lines 24-40.) Although sub-geosynchronous orbits are described, the *Taormina* reference neither teaches nor suggests, for example, "a plurality of satellites located in an **elliptical** sub-geosynchronous orbit with respect to the earth, **said satellites operating in a service area in a synchronized manner to provide continuous coverage to said service area.**" Applicant agrees with the Examiner in his assessment in the last office action that variable beam widths to obtain a substantially uniform cell size is not shown in *Taormina*.

Claims 8 and 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Castiel* in view of *Porcelli* in further view of *Schloemer* (RE37140).

Claims 8 and 18 recite disabling a satellite when it is coextensive with a geostationary orbit. Although the Examiner alleges that, "Schloemer discloses the

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satellites are disabled when coextensive with a geostationary orbit (see Col.2, lines 45-50)", the *Schloemer* reference merely discusses satellites that accidentally end up in an improper orbit and ground control systems to insure that all satellite stay in correct orbits "and to disable a satellite when it is not in the proper grid orbit". This neither teaches nor suggests disabling a satellite when coextensive with a geostationary orbit, as would happen for example in a defined GSO Crossing Zone. Furthermore, it is respectfully submitted that Claims 8 and 18 are allowable over these references since the *Schloemer* reference does not cure the deficiencies of the teachings of the *Castiel* and *Porcelli* references as discussed earlier in connection with Claims 1 and 12 and therefore Claims 8 and 18 are allowable generally for the same reasons discussed in connection with Claims 1 and 12 and further due to the additional limitations recited therein.

Claim 2 stands rejected under 35 U.S.C. §103(a) as being unpatentable over *Castiel* in view of *Porcelli* in further view of *Byrne* (4,990,883).

Claim 2 recites that the ground stations are coupled to one of the internet service provider, television center and a corporate internet. Although various connections are described in the *Byrne* reference fails to teach or suggest the limitations missing from the *Castiel* or *Porcelli* references. Namely, the *Byrne* reference does not teach or suggest beam widths that vary due to the position in orbit. Applicant therefore respectfully requests the Examiner to reconsider this rejection as well.

Claim 16 stands rejected under 35 U.S.C. §103(a) as being unpatentable over *Castiel* in view of *Porcelli* in further view of *Wainfan* (6,339,707).

Claim 16 recites that the service area is a primary market area having an elevation greater than 30 degrees. Although an elevation angle greater than 30 degrees is set forth in the *Wainfan* reference, no teaching or suggestion is provided for a satellite constellation that has satellites that form a plurality of beams with beam widths that vary as a function of the position in the orbit. Applicant therefore respectfully requests the Examiner to reconsider the rejection of Claim 16.

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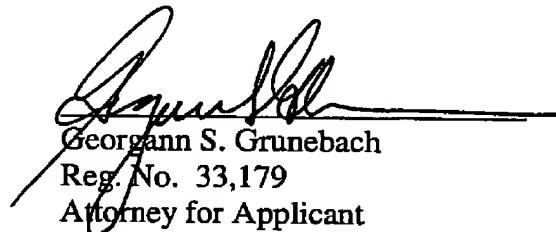
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Applicant notes that Claim 34 does not stand rejected. It is presumed that Claim 34 is allowable.

In light of the above remarks, Applicant submits that all rejections are now overcome. The application is now in condition for allowance and expeditious notice thereof is earnestly solicited. Should the Examiner have any questions or comments which would place the application in better condition for allowance, he is respectfully requested to call the undersigned attorney.

Respectfully submitted,



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